

REMARKS

The final Office Action mailed July 6, 2010 has been carefully considered. Reconsideration in view of the following remarks is respectfully requested.

Rejection(s) Under 35 U.S.C. § 103(a)

Claim 1 stands rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Drori (U.S. pat. no. 6,501,249; hereinafter, “Drori”) and Nguyen (U.S. pat. no. 5,402,055; hereinafter, “Nguyen”). Claim 1 has been canceled without prejudice or disclaimer of its subject matter, and the rejection thereof is moot.

Claims 2-3 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Drori (U.S. pat. no. 6,501,249; hereinafter, “Drori”) and Nguyen (U.S. pat. no. 5,402,055; hereinafter, “Nguyen”) over Kaneko (US pat. no. 5,932,990; hereinafter, “Kaneko”). Claim 2 has been canceled without prejudice or disclaimer of its subject matter, and the rejection thereof is moot.

Claims 3 as amended now recites,

“a control circuit that ... is connected to ... said plurality of said voltage regulation circuits ... to set a uniform full-charge voltage as said full-charge reference voltage in all of said plurality of said voltage regulation circuits, and switches said switch when said cell voltage of any said plurality of said series-connected lithium ion batteries shows overcharging or over-discharging”. (Emphasis added)

The structural feature is described in the specification on page 7, lines 12 to 18, to read as,

“the control circuit 7 is constituted of a microcomputer, and has a function of ...setting... a full-charge reference voltage in the voltage regulation circuit 5...”

and FIG. 3 (see “FULL-CHARGE REFERENCE VOLTAGE”).

Similarly, in newly added claim 4, each of the voltage regulation circuits comprises a

differential amplifier supplied with said full-charge reference voltage from said control circuit.

Because of the structural features, when the lithium ion batteries 1 are fully charged, variations among the charge voltages of the lithium ion batteries 1 occur due to changes in the internal impedances of the lithium ion batteries 1, the operation of the voltage regulation circuits 5 can adjust the charge voltages of all the lithium ion batteries 1 to a uniform charge voltage, as described on page 9, lines 9-14.

In clear contrast, while Kaneko disclosed a plurality of charging control units 5a to 5n which may correspond to voltage regulation circuits of the present invention, it fails to disclose any control circuit which is connected to a plurality of the charging control units 5a to 5n to set a uniform full-charge reference voltage in a plurality of the charging control units 5a to 5n. Kaneko also fails to disclose each of the charging control units 5a to 5n is supplied with the full-charge reference voltage from an outside control unit with respect to claim 4 of the present invention.

Rather, as shown in FIG. 2 of Kaneko, each of the charging control units 5a to 5n has a voltage-regulator circuit 13 including a step-up circuit 12, to generate a full charge reference voltage V_{full} which is compared with the inter-electrode voltage V of associated battery cell 1 (see column 5, lines 13 to 45). That is, the reference voltage V_{full} is separately generated for each of the charging control units 5a to 5n. The reference voltage V_{full} in the charging control units 5a is thus inevitably different from that in the charging control units 5b, for instance, and therefore, the reference voltages V_{full} in the charging control units 5a to 5n cannot be uniform. As a result, there is a disadvantage that the values of the full-charge voltage of all the battery cells 1a to 1n, which are controlled by the charging control units 5a to 5n, respectively, are also different from each other.

None of Drori and Nguyen teaches that a plurality of lithium ion batteries are connected in series, and its system is provided with a voltage regulation circuit that is connected in parallel with each lithium ion battery of the plurality of series-connected lithium ion batteries. Drori and Nguyen therefore fail to disclose the above structural feature of the present invention, as a matter of course. Further, no reasonable combination of Drori, Nguyen and Kaneko teaches or suggests

the above-noted limitation.

Conclusion

In view of the preceding discussion, Applicants respectfully urge that the claims of the present application define patentable subject matter and should be passed to allowance.

If the Examiner believes that a telephone call would help advance prosecution of the present invention, the Examiner is kindly invited to call the undersigned attorney at the number below.

Please charge any additional required fees, including those necessary to obtain extensions of time to render timely the filing of the instant Response to Office Action, or credit any overpayment not otherwise credited, to our deposit account no. 50-3557.

Respectfully submitted,
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